

## REMARKS

Applicants request favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

Claims 28, 29, 33, 34, and 38-55 are presented for consideration. Claims 28, 33, 42, and 51 are independent. Claims 51-55 have been added to recite additional features of the subject invention. Support for these claims can be found in the original application, as filed. Therefore no new matter has been added.

Claims 28, 29, 33, 34, and 38-41 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,424,552 to Tsuji et al. Claims 28, 29, 33, 34, and 38-50 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,754,340 to Ushida et al. Applicants submit that the cited art does not teach or suggest many features of the present invention, as recited in these claims. Therefore, these rejections are respectfully traversed. Applicants further submit that claims 28, 29, 33, 34, and 38-55, as presented, amplify the distinctions between the present invention and the cited art.

In one aspect of the invention, independent claim 28 recites an optical system for forming an image of an object. The optical system includes an optical element, which is deformed by the weight thereof, and at least one optical member for preventing a change in optical performance of the optical system due to deformation of the optical element, when the optical element is provided in the optical system.

In another aspect of the invention, independent claim 33 recites a projection exposure apparatus that includes an illumination optical system for illuminating a pattern formed on a mask, and a projection optical system for projecting the pattern of the mask onto a wafer, the

projection optical system including (i) an optical element being deformed by the weight thereof, and (ii) at least one optical member for preventing a change in optical performance of the optical system due to deformation of the optical element, when the optical element is provided in the optical system.

In still another aspect of the invention, independent claim 42 recites an optical system that includes an optical element, the optical element being deformed by the weight thereof and having a refractive power, and at least one optical member for preventing a change in optical performance of the optical system due to deformation of the optical element, when the optical element is provided in the optical system.

In yet another aspect of the invention, independent claim 51 recites an optical system for forming an image of an object. The optical system includes an optical element being able to be deformed by weight thereof, and at least one optical member having an aspherical surface effective to prevent a change in optical performance of the optical system due to deformation of the optical element as the optical element is provided in the optical system, the at least one optical member being disposed adjacent the optical element.

Applicants submit that the cited art does not teach or suggest such features of the present invention, as recited in independent claims 28, 33, 42, and 51.

The Tsuji, et al. patent focuses on the problem of tilt or distortion of an image plane which results from deformation of a reticle caused by its weight or by the absorption of illumination light. That is, the tilt or distortion of the image plane results from distortion of the object plane (reticle surface). In order to avoid this problem, the invention disclosed in Tsuji, et

al. uses optical elements 40, 41, 43, and 45 which function to prevent tilt or distortion of the image plane even if the reticle (object surface) is deformed.

Accordingly, the Tsuji, et al. patent does not teach or suggest at least one optical member that prevents a change in optical performance of the optical system due to deformation of an optical element, when the optical element is provided in the optical system, in the manner of the present invention recited in the independent claims.

In particular, the reticle disclosed in Tsuji, et al. does not correspond to the optical element, which is deformed by the weight thereof, of the present invention. Rather, the reticle in Tsuji, et al. merely corresponds to the “object” of which the optical system is forming an image (see the preamble of Claim 28 of the present application). Therefore, Tsuji, et al. fails to disclose or suggest the present invention.

Moreover, the present invention, as specifically claimed in the independent claims, provides an advantage of “preventing a change in optical performance of the optical system.” Conversely, the structure of Tsuji, et al. is arranged to, in fact, change the optical performance of the optical system so that the deformed reticle can be imaged upon a tilt or distortion free image plane (see PL in Figure 1 of that patent). As such, the function of the device in Tsuji, et al. is diametrically opposed to that of the present invention.

The Ushida, et al. patent relates to a projection optical system that decreases the secondary spectrum of chromatic aberration. That patent shows a diffraction optical element 111, a quartz lens 121, and a fluorite lens 131. However, Ushida, et al. is completely silent with respect to an optical element that is deformed by the weight thereof. In turn, that patent is silent regarding use of at least one optical member for preventing a change in optical performance of

the optical system due to deformation of the optical element, when the optical element is provided in the optical system. Accordingly, the Ushida, et al. patent likewise does not teach or suggest the salient features of Applicants' present invention, as recited in the independent claims.

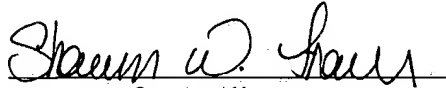
For the foregoing reasons, Applicants submit that the present invention, as recited in independent claims 28, 33, 42, and 51 is patentably defined over the cited art, whether that art is taken individually or in combination.

The dependent claims also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Individual consideration of these dependent claims is requested.

Applicants further submit that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

  
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